JUL 2 2 1970

REPLY TO
ATTN OF: FA/70/31

MEMORANDUM TO: See attached list

FROM   :   Chairman, Software Control Board

SUBJECT   :   A little status report on Apollo spacecraft computer
                 programs

A number of interesting spacecraft computer program things came up at our
July 10 Software Control Board Meeting and subsequently. I would like to
just make a note of them before the formal minutes are distributed.

   a.   MIT's long range attack on the Luminary computer cycle problem
during descent is development of what they call "variable servicer."
They have an offline version called "Zerlina" running now. We plan to
hold a design review and then decide what to do with it at our August
meeting which will be in time to apply to Apollo 15. I have mixed feel-
ings about variable servicer. Obviously, we think the steps we have taken
for Apollo 13 and 14 are adequate. An interesting off-shoot of Zerlina,
though, is that it is designed to correct a couple of other problems.
Specifically, MIT now agrees with Grumman that the cross pointers can be
in error by as much as 3.5 fps during terminal descent. (Note: This is
not a new anomaly. It existed on all previous flights. We just were not
aware of how bad it was until Clint Tillman rubbed our noses in it -
several times.) This display of horizontal velocity is not mandatory but
Apollo 14 crew feedback since the meeting indicates it nearly is! Gene
Cernan in particular thinks it's very important that we fix it right away.
Coincidentally, some manufacturing problem has made it necessary for
Raytheon to start over on the Luminary ropes. And the flight schedule
has slipped such that mid-September is now the "normal" program release
date. Therefore, we have shelved the original Apollo 14 version of
Luminary and MIT is preparing a program development plan for transferring
about 300 words of the Landing Analog Display Routine (R 10) from Zerlina
to Luminary - this being the easiest, least risky way of fixing the cross
pointer anomaly in MIT's opinion. And, that's what we'll probably end up
flying. Incidentally, this R 10 change also fixes the h error which
occurs earlier in descent and we may tune up a few other things, too.

   b.   As you know, there are three rather significant new capabilities
we are adding to the command module computer program. They have all been
under development for some time and are implemented in an offline version
for analysis and crew evaluation. We are now putting two of these pro-
grams under configuration control. They are the reduced workload "Minkey"
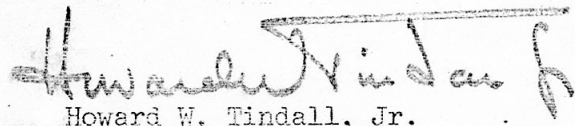rendezvous and the Universal Pointing Programs. We are doing this even

though I am sure a number of changes are still desirable because they are in pretty good shape now and we'll never get them settled down without configuration control.

    c. The third addition is the new SATURN DAP which was supposed to make manual steering during the launch phase easier for the crew. Currently, there is some uncertainty that the new system is better. Don Cheatham is attempting to settle this issue with the help of FCSD, MIT, and some astronauts. I am hoping we may find we can delete it and save everybody a lot of work and grief. It was interesting to discover that the design of the DAP does not only help the crew but even provides the capability of manual steering with unrelated Saturn failures such as engine-out or hard-over.

    d. In order to relieve the massive workload of the LMP during rendezvous, we have finally agreed to provide automatic rendezvous radar updating into the AGS for Apollo 15. This data will be relayed to the AGS through the PGNS downlink. All the necessary coordination has been done to insure compatibility of the two systems.

    e. We also intend to do something to help the Skylab command module crew during rendezvous. Specifically, we are "creating" a rendezvous radar using software with the VHF ranging by implementing a program developed by TRW which is said to deduce accurate range rate information from the range data. We are going to provide two modes. One will display to the crew the current range and range rate on the DSKY. The other will permit the crew to input a future time at which the DSKY will freeze on the range rate value for convenience in working the backup chart solutions.

    f. Finally, Steve Copps suggested a worthwhile economy, i.e., deletion of all testing of the rendezvous and landmark tracking programs in earth orbit. This, of course, implies that they can not be used but no alternate mission requires them, so that's fine. The price was right so we bought it.

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